

SSPC: The Society for Protective Coatings

Coating Standard No. 38

Single-Component Moisture-Cure Weatherable Aliphatic Polyurethane Topcoat, Performance-Based

1. Scope

1.1 This standard contains performance requirements for a high-performance, single-component, moisture-curing UV-stable polyurethane topcoat (ASTM D 16, Type II polyurethane) for use on steel substrates. The coating is intended to be used as a topcoat that provides good color and gloss retention.

1.2 Coatings meeting the requirements of this standard are generally suitable for exposures in SSPC Environmental Zones 1A (interior, normally dry), 1B (exterior, normally dry), 2A (frequently wet by fresh water, excluding immersion), 2B (frequently wet by salt water, excluding immersion), 3B (chemical exposure, neutral) and 3C (chemical exposure, alkaline)¹.

1.3 The coating is intended for application by brush, spray, or roller over a primer or intermediate coating.

2. Description

2.1 This single-package moisture-curing polyurethane coating is characterized by the presence of free polyisocyanate groups capable of reacting with atmospheric moisture in order to form a film.

2.2 WEATHERING LEVELS: This standard contains three levels of accelerated (A) and South Florida weathering (SF) performance described in Section 7.2.

3. Referenced Standards

3.1 The latest issue, revision, or amendment of the referenced standards in effect on the date of invitation to bid shall govern, unless otherwise specified. Standards marked with an asterisk (*) are referenced only in the Notes, which are not requirements of this standard.

3.2 If there is a conflict between the requirements of any of the cited referenced standards and this standard, the requirements of this standard shall prevail.

3.3 SSPC STANDARD:

Guide 13 Guide for the Identification and Use of Industrial Coating Materials in Computerized Product Databases

3.4 ASTM STANDARDS:²

D 16	Standard Terminology for Paint, Related Coatings, Materials, and Applications
D 523	Standard Test Method for Specular Gloss
* D 562	Standard Test Method for Consistency of Paints Measuring Krebs Units (KU) Viscosity Using the Stormer-Type Viscometer
D 1014	Standard Practice for Conducting Exterior Exposure Tests of Paints and Coatings on Metal Substrates
* D 1296	Standard Test Method for Odor of Volatile Solvents and Diluents
* D 1475	Standard Test Method for Density of Liquid Coatings, Inks, and Related Products
* D 1535	Standard Practice for Specifying Color by the Munsell System
* D 1640	Standard Test Methods for Drying, Curing, or Film Formation of Organic Coatings at Room Temperature
D 2244	Standard Test Method for Calculation of Color Tolerances and Color Differences From Instrumentally Measured Color Coordinates
* D 2369	Standard Test Method for Volatile Content of Coatings
* D 2371	Standard Test Method for Pigment Content of Solvent-Reducible Paints
* D 2621	Standard Test Method for Infrared Identification of Vehicle Solids from Solvent-Reducible Paints
* D 2697	Standard Test Method for Volume Nonvolatile Matter in Clear or Pigmented Coatings
D 2794	Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
D 4214	Standard Test Methods for Evaluating Degree of Chalking of Exterior Paint Films

¹ SSPC Environmental Zones are defined in "About SSPC Standards and Guides" available online from <<http://www.sspc.org>>.

² ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959. For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For Annual Book of ASTM Standards volume information, refer to the standard's Document Summary page on the ASTM website.

- D 4541** Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
- D 4587** Standard Practice for Fluorescent UV-Condensation Exposures of Paint and Related Coatings
- D 5402** Standard Practice for Assessing the Solvent Resistance of Organic Coatings Using Solvent Rubs
- G 154** Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials

3.5 AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI) STANDARD:³

- Z129.1** Hazardous Industrial Chemicals – Precautionary Labeling

3.6 AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO) STANDARD:⁴

- TP 67-03** Standard Method of Test for Analysis of Structural Steel Coatings for Isocyanate Content

4. Composition Requirements

4.1 RESIN REQUIREMENT: The resin used in the coating shall be a polyisocyanate-based product that cures through a chemical reaction with atmospheric moisture. Use of other resins or modifiers shall be minimal and limited to products necessary for formula ingredient compatibility and to improve recoating properties. Manufacturer's formulations of single-component moisture-curing weatherable polyurethane topcoats normally contain levels of polyisocyanate in vehicle solids above 3.5% by weight, as determined by AASHTO TP 67-03.

4.2 VOC CONTENT: See Note 11.1 for information on VOC content.

4.3 ANALYTICAL TEST DATA: If required, the coating manufacturer shall provide certificates of analysis for coating batches qualified by independent testing to meet this standard for use in verifying batch-to-batch consistency of material (see Note 11.2 and subsections)

5. Requirements of Liquid Coating

5.1 STORAGE STABILITY: The coating shall exhibit no curdling, gelling, gassing, or hard caking after being stored unmixed for a minimum of 180 days in a tightly sealed, unopened container at a temperature of 25 degrees C (77 degrees F).

³ American National Standards Institute, 1819 L Street, NW, Suite 600, Washington, DC 20036. Standards available online from www.ansi.org

⁴ American Association of State Highway and Transportation Officials, 444 North Capitol Street, NW, Suite 249, Washington DC 20001, 202-624-5800. Standards available online at <https://bookstore.transportation.org>

5.2 APPLICATION PROPERTIES: All guidance provided by the manufacturer regarding thinning requirements and special application requirements shall be followed (see Note 11.3). The coating shall be easily applied by brush, roller, or spray in accordance with the manufacturer's written instructions. The coating shall have no streaking, running, or sagging or other defects during application or while drying.

6. Test Panel Preparation

Triplicate test panels shall be prepared for each test. Prior to application of the topcoat to be tested, a compatible primer and intermediate coat recommended by the manufacturer of the topcoat to be tested shall be applied to the panels and cured in accordance with the manufacturer's written instructions. The topcoat to be tested shall be applied according to the manufacturer's written recommendations.

7. Weathering Requirements

7.1 WEATHERING RESISTANCE: Two weathering test procedures are defined below. Performance levels are established using whites and light colors. It is left to the discretion of the specifier whether to accept Florida data from a similar color or to use UV-A data in lieu of South Florida weathering data. [NOTE: Commercial test sites in North America conforming to this requirement are located in southern Florida and Arizona.]

7.1.1 Accelerated Weathering: Accelerated weathering shall be performed in accordance with ASTM D 4587, Cycle 2.

Apparatus – Fluorescent UV/condensation apparatus complying with ASTM G 154.

TABLE 1
TIME CORRESPONDING TO EACH PERFORMANCE LEVEL

Performance Level	Hours to Noticeable Change*	Cycles to Noticeable Change*
	Accelerated UVA/Condensation	
Level 1	500 to 1000	63 to 125
Level 2	1001 to 2000	126 to 250
Level 3	2001 or more	251 or more

* Noticeable change following Accelerated UV-A/Condensation testing is defined as a gloss reduction of 25% or more of the initial gloss value measured at a 60° angle or a color change greater than 3.0 ΔE* (see Section 7.2.1).

TABLE 2
SOUTH FLORIDA WEATHERING PERFORMANCE

Performance Level	Months to Noticeable Change*
Level 1	12 to 23
Level 2	24 to 47
Level 3	48 or more

* Noticeable change following Florida exposure testing is defined as a gloss reduction of 35% or more of the initial gloss value measured at a 60° angle or a color change greater than 3.0 ΔE* (see Section 7.2.1).